IS471F

Sensors

ELEKTOR ELECTRONICS

DATASHEET 4/99

IS471F

OPIC™ Light Detector with Built-in Signal Processing Circuit for Light Modulation System

Manufacturer

Sharp Corp.

Features

- Impervious to external disturbing lights due to light modulation system
- Built-in pulse driver circuit and sync. detector circuit on the emitter side
- A wide range of operating supply voltage (V_{cc}: 4.5 to 16V)

Applications

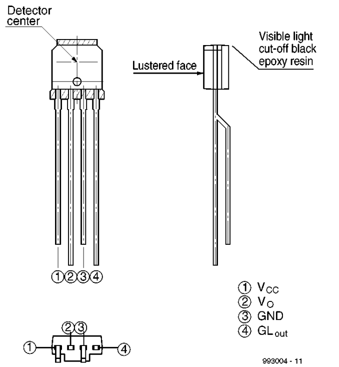
- Optoelectronic switches
- Copiers, printers
- Facsimile equipment

Application Example

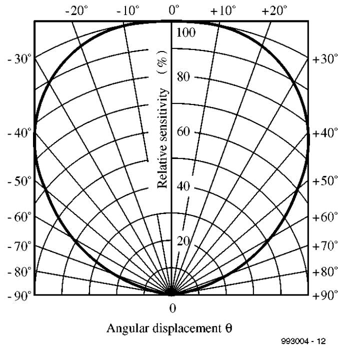
LightFinder, *Elektor Electronics* April 1999

Absolute Maximum Ratings (T_a = 25ºC)

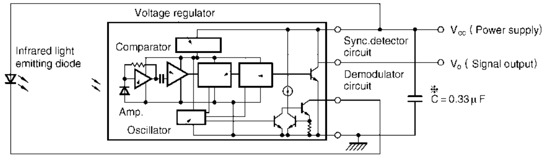
Parameter		Symbol	Rating	Unit
Supply voltage		V_{CC}	–0.5 to 16	V
Output	Output voltage	V_O	16	V
	Output current	I_O	50	mA
GL output	Output voltage	V_{GL}	16	V
Power dissipation		P	250	mW
Operating temperature		T_{OPR}	–25 to +60	ºC
Storage temperature		T_{STG}	–40 to +100	ºC
Soldering temperature		T_{SOL}	260	ºC



OPIC (Optical IC) is a trademark of the Sharp Corporation. An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.



Sensitivity diagram (T_a = 25ºC)



❈ In order to stabilize power supply line, connect a by-pass capacitor of 0.33µF or more between Vcc and GND near the device.

Basic circuit

MAX192

Integrated Circuits
A-D Converters

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MAX192

Low-power, 8-channel, Serial 10-bit ADC

Manufacturer

Maxim Integrated Products (UK) Ltd., Unit 3, Theale Technology Centre, Station Road, Theale, Berks RG74XX. Internet: www.maxim-ic.com

Applications

- Automotive
- Pen-entry Systems
- Consumer Electronics
- Portable Data Logging
- Robotics
- Battery-Powered Instruments, Battery Management
- Medical Instruments

Features

- 8-Channel Single-Ended or 4-Channel Differential Inputs
- Single +5V Operation
- Low Power: 1.5mA (operating)
  2µA (power-down)
- Internal Track/Hold, 133kHz Sampling Rate
- Internal 4.096V Reference
- 4-Wire Serial Interface is Compatible with SPI, QSPI, Microwire, and TMS320
- 20-Pin DIP, SO, SSOP Packages
- Pin-Compatible 12-Bit Upgrade (MAX186/MAX188)

Application Example

Video DVM, *Elektor Electronics* May 1999.

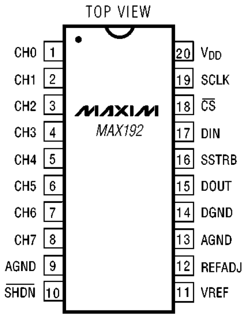
General Description

The MAX192 is a low-cost, 10-bit data-acquisition system that combines an 8-channel multiplexer, high-bandwidth track/hold, and serial interface with high conversion speed and ultra-low power consumption. The device operates with a single +5V supply. The analog inputs are software configurable for single-ended and differential (unipolar/bipolar) operation. The 4-wire serial interface connects directly to SPI™, QSPI™, and Microwire™ devices, without using external logic. A serial strobe output allows direct connection to TMS320 family digital signal processors.

The MAX192 uses either the internal clock or an external serial-interface clock to perform successive approximation A/D conversions. The serial interface can operate beyond 4MHz when the internal clock is used. The MAX192 has an internal 4.096V reference with a drift of ±30ppm typical.

A reference-buffer amplifier simplifies gain trim and two sub-LSBs reduce quantization errors. The MAX192 provides a hardwired $\overline{\text{SHDN}}$ pin and two software-selectable power-down modes. Accessing the serial interface automatically powers up the device, and the quick turn-on time allows the MAX192 to be shut down between conversions. By powering down between conversions, supply current can be cut to under 10µA at reduced sampling rates.

The MAX192 is available in 20-pin DIP and SO packages, and in a shrink-small-outline package (SSOP) that occupies 30% less area than an 8-pin DIP. The data format provides hardware and software compatibility with the MAX186/MAX188. For anti-aliasing filters, consult the data sheets for the MAX291–MAX297.



DIP/SO/SSOP

MAX192

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Integrated Circuits
A-D Converters

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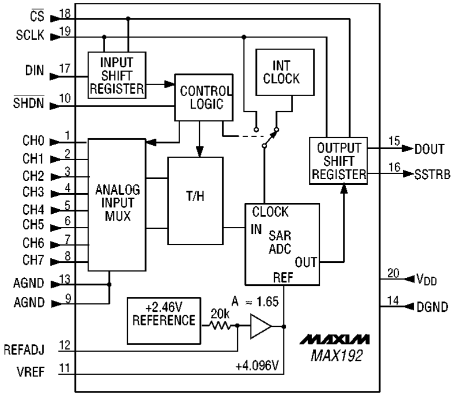
Pin Description

Pin	**Name**	**Function**
1–8	CH0–CH7	Sampling Analog Inputs
9, 13	AGND	Analog Ground. Also IN– Input for single-enabled conversions. Connect both AGND pins to analog ground.
10	$\overline{\text{SHDN}}$	Three-Level Shutdown Input. Pulling $\overline{\text{SHDN}}$ low shuts the MAX192 down to 10µA (max) supply current, otherwise the MAX192 is fully operational. Pulling SHDN high puts the reference-buffer amplifier in internal compensation mode. Letting $\overline{\text{SHDN}}$ float puts the reference-buffer amplifier in external compensation mode.
11	VREF	Reference Voltage for analog-to-digital conversion. Also, Output of the Reference Buffer Amplifier. Add a 4.7µF capacitor to ground when using external compensation mode. Also functions as an input when used with a precision external reference.
12	REFADJ	Reference-Buffer Amplifier Input. To disable the reference-buffer amplifier, tie REFADJ to VDD.
14	DGND	Digital Ground
15	DOUT	Serial Data Output. Data is clocked out at the falling edge of SCLK. High impedance when $\overline{\text{CS}}$ is high.
16	SSTRB	Serial Strobe Output. In internal clock mode, SSTRB goes low when the MAX192 begins the A/D conversion and goes high when the conversion is done. In external clock mode, SSTRB pulses high for one clock period before the MSB decision. SSTRB is high impedance when $\overline{\text{CS}}$ is high (external mode).
17	DIN	Serial Data Input. Data is clocked in at the rising edge of SCLK.
18	$\overline{\text{CS}}$	Active-Low Chip Select. Data will not be clocked into DIN unless $\overline{\text{CS}}$ is low. When $\overline{\text{CS}}$ is high, DOUT is high impedance.
19	SCLK	Serial Clock Input. Clocks data in and out of serial interface. In external clock mode, SCLK also sets the conversion speed. (Duty cycle must be 45% to 55%.)
20	VDD	Positive Supply Voltage, +5V ±5%



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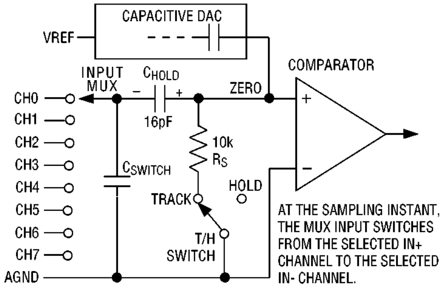
Block Diagram.



SINGLE-ENDED MODE: IN+ = CH0-CH7, IN- = AGND.
DIFFERENTIAL MODE (BIPOLAR): IN+ AND IN- SELECTED FROM PAIRS OF CH0/CH1, CH2/CH3, CH4/CH5, CH6/CH7.

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Equivalent Input Circuit.

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Electro-optical characteristics (V_{CC} = 5V, T_a = 25°C)

Parameter		**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Operating supply voltage		V_{CC}	-	4.5	-	16	V
Supply current		I_{CC}	V_O, GL terminals shall be opened	-	3.5	7.0	mA
Output	Low level output voltage	V_{OL}	I_{OL} = 16mA, E_{VP} = 500lx, E_{VD} = 0	-	0.15	0.35	V
	High level output voltage	V_{OH}	$E_{VD} = E_{VP}$ = 0	4.97	-	-	V
	Output short circuit current	I_{OS}	$E_{VP} = E_{VD}$ = 0	0.25	0.5	1.0	mA
GL output	Low level output current	I_{GL}	V_{GL} = 1.2V	40	55	70	mA
	Pulse cycle	t_P	-	70	130	220	µs
	Pulse width	t_W	-	4.4	8	13.7	µs
Low-to-high threshold irradiance		E_{ePLH}	E_{eD} = 0, light emitting diode (λ_p = 940nm)	-	0.4	2.66	µW/mm2
High-to-low threshold irradiance		E_{ePHL}		-	0.7	2.8	µW/mm2
Hysteresis		E_{ePLH}/E_{ePHL}		0.45	0.65	0.95	-
Response time	High-to-low propagation delay time	t_{PHL}		-	400	670	ms
	Low-to-high propagation delay time	t_{PLH}		-	400	670	ms
External disturbing light illuminance		E_{VDX}	E_{eP} = 7.5µW/mm^2, λ_p = 940 nm	2000	7500	-	lx

E_{eP} represents illuminance of signal light in sync with the low level timing of output at GLout terminal.
E_{eD} represents illuminance of DC light. Light source: LED (λ_p = 940 nm).
E_{VP} represents illuminance of signal light in sync with the low level timing of output at GLout terminal.
E_{VD} represents illuminance of DC light. Light source: CIE standard light source A.